WQB "Wide Aperture Quad" for Main Injector

10 November 2005, 9:00 AM
IB2 conference room

Attendees: Linda Alsip, Bruce Brown, Weiren Chou, TJ Gardner, Hank Glass, Dave Harding, Bill Robotham, Linda Valerio, John Zweibohmer

Measurements

Hank expanded on his earlier analysis of the off-center harmonics in WQB001, showing the harmonic components as a function of position, fits of polynomials to those distributions, and excellent agreement among independent determinations of several harmonics, including several not directly accessible with the Morgan coil windings. This allows reliable reconstruction of the magnetic field out to about 1.5 or 1.7 inches and shows modest agreement with the stretched wire data beyond that. Adding well-measured higher harmonics improves the agreement, but the magnet-probe geometry limits our ability to measure at the farthest reaches with the rotating coil. The SSW data is more reliable at the highest radii. The last piece of the WQB001 analysis is adding the 200 A SSW data to the graph. SSW scans of WQB002 were requested.

Hank showed the recent trim coil measurements on WQB002. After a hysteresis cycle, the main coil was brought one of the standard currents (200, 1000, 2800, or 3600 A) and the trim coil was excited to +50 A twice. Starting from the same base currents, Hank compared dGL/dI for the main coil and the trim coil, taking into account the different number of turns. He found the trim coils about 1% more effective than the main coils at all excitations except 3600 A, where they were ~6% stronger than expected. This is a small correction to a small correction, so there is no practical concern, but we will ask Vladimir to model this.

At low main coil currents the trim coils will run with negative current, so one additional measurement set was requested. MTF's unipolar trim power will be connected to subtract, rather than add, to the main coil. With the main coil at full current for a hysteresis cycle, the trim coil will be turned on to some suitable value and held on as the main coil is brought to a 150 A reset current, then up to 200 A. The trim coil will then be run around a hysteresis loop while taking measurements. This will more closely replicate the operating conditions at injection.

Design issues

Bill Robotham is adjusting the assembly drawing to depict a square foot to replace the round currently at the center point position, per Linda Valerio's request. Linda Alsip reported that the square stock material is on order and that our tooling group will fabricate these parts.

Fabrication

WQB001 has been returned to MTF for production measurements. This magnet is complete with the exception of the replacement square foot and beam tube flanges.

WQB002 is in IB1. It needs the vacuum flanges, manifold protectors and the square foot.

WQB003 is in IB1 and needs the same finishing touches as WQB002.

WQB004 is still in IB2 waiting for the same finishing touches as WQB002.

WQB005 is complete but needs the same finishing touches as WQB002.

WQB006 is welded.

WQB007 has the bottom half assembled and ready for the assembly/rollover fixture. Top half cores and coils are ready to glue together next.

WQB008 has all main coils wound. Stacking of cores for both 008 and 009 has been interrupted to stack spare p-bar pulsed magnet cores. Then we will retool to complete WQB core stacking.

WQB009 has all coils wound.

Schedule

TD is aiming to have seven magnets fabricated and measured by the end of December. WQB008 and 009 will be ready mid January to allow the review of data and selection of the best seven for installation.

Next meeting will be Thursday, 1 December 2005, at 9:00 in the Industrial Building 2 conference room.